AMENDMENTS TO THE SPECIFICATION

Replace the paragraph beginning at page 4, line 19 with the following paragraph:

As an example of an Ethernet system, Figure 2 shows a network 10 having stations ~~12~~ 12A, 12B, ..., 12N connected to an optical bus 14. Each of these stations 12A, 12B, ..., 12N is connected to the bus 14 through a coupler 16A, 16B, ..., 16N. As mentioned above, the Ethernet protocols are designed to include collisions between stations trying to capture the bus. Figure 3 provides an explanation as to how such a network 10 can recover from a collision. At 22, both stations ~~A~~ 12A and ~~B~~ 12B are ready to transmit and listen on the bus for a clear line, such as for a 96 bit time period. At 23, at the end of this 96 bit delay period, both stations ~~A~~ 12A and ~~B~~ 12B determine that the line is clear and begin transmitting while simultaneously listening. At 24, the signal from ~~the A~~ station 12A reaches ~~the B~~ station 12B, at which point ~~the A~~ station 12A detects a collision. At 25, ~~the A~~ station 12A transmits a jamming signal to ensure that ~~the B~~ station 12B sees the collision before ~~the A~~ station 12A finishes its message. At 26, ~~the B~~ station 12B detects the signal from ~~the A~~ station 12A and responds by sending a minimal length jamming signal. Both ~~the A~~ station 12A and ~~the B~~ station 12B then enter a back-off protocol, during which the stations 12A and 12B wait a period of time before attempting to communicate again over the bus 14. As should be apparent from Figure 3, the entire time that the stations 12A and 12B are listening on the bus 14, transmitting their signals, transmitting jamming signals, and then the delays during the back-off protocol are all times that the bus 14 is under-utilized.

Replace the paragraph beginning at page 6, line 15 with the following paragraph:

Figure 6 illustrates an approach taken to improve the through-put and performance of a network. The network 40 shown in Figure 6 includes a backbone 41 and a number of spoke networks 44 connected to the backbone 41 with switches or hubs 42A and 42B. The backbone 41 is able to operate at higher speeds than the spoke networks 44. Each spoke network 44 interconnects a number of stations 45A, 45B, 45C, 45D, 45X, 45Y, and 45Z, such as the spoke network 44 of stations 45A, 45B, 45C, and 45D. The high speed rating of the main backbone bus 41 is perhaps misleading since the actual bandwidth between any pair of stations 45A, 45B, 45C, 45D, 45X, 45Y, and 45Z is limited to the performance of the switched or hub networks 44. Thus, despite the high speed ratings of many Ethernet networks, the actual bandwidth available at a single station is significantly less than this rating of the network backbone 41.

Replace the paragraph beginning at page 13, line 22 with the following paragraph:

An exemplary message sequence 60 is shown in Figure 8. The typical message sequence 60 includes the BOS message 61 followed by messages 62A, 62B, ... , 62N from each of the stations 1 to N. Although the BOS message 61 can be separate from the message from the SBM, the BOS message 61 and the message from the SBM are preferably combined to improve utilization of the network. After each station has transmitted its message, the EBM transmits the EOS message 64 symbolizing the end of a message sequence 60. In operation, each station waits for the end of a transmission from the station immediately

preceding it in the order of transmission. Once a station sees this message from its predecessor, the station can then insert its own message ~~61~~62 into the message sequence 60. While the messages from each of the stations 1 to N are represented with equal lengths, as will be appreciated from the description below, each station can transmit messages of varying lengths, from a synch message indicating that no message is being transmitted to the maximum message length, if one is imposed by the network designer. Each station preferably transmits at least some message, such as a synch message, even if it does not have any data to transmit in order to inform the next station in the order that it can transmit its message. When a station detects the EOS message ~~62~~64, the station can assume that its message was successfully transmitted. In contrast to Ethernet, the messages ~~61~~62A, 62B, ... , 62N need not contain extraneous bits which are added to ensure successful delivery of the message.

Replace the paragraph beginning at page 16, line 5 with the following paragraph:

Figure 9 illustrates an example of a network 70 according to the preferred embodiment of the invention. The network 70 includes a plurality of stations 72A ~~A~~ and 72B connected to a bus 74 through couplers 76A1, 76A2, 76B1, and 76B2. The bus 74 actually includes a plurality of busses, illustrated here with two busses 74A and 74B with bus 74A being a primary bus and bus 74B being a redundant back-up bus. The couplers 76A1, 76A2, 76B1, and 76B2 route signals from each station 72A, 72B in both directions along each of the busses 74A and 74B. A single signal therefore is split into four components and

routed in four directions 71A, 71B, 71C, and 71D. As represented in this diagram, a message sequence 71A travels along bus 74A in a direction from ~~the A~~ station 72A to ~~the B~~ station 72B, a message sequence 71B travels along bus 74A in an opposite direction away from ~~the B~~ station 72B, a message sequence 71C travels along bus 74B in a direction from ~~the A~~ station 72A to ~~the B~~ station 72B, and a message sequence 71D travels along the bus 74B in an opposite direction away from ~~the B~~ station 72B. While not shown in the Figure, signals from ~~the B~~ station 72B, as well as all other stations, are split into separate components and routed in opposite directions on the busses 74A and 74B. The messages may be of variable length whereby each station need not transmit the same size message nor need they pad their message with extra bits. ~~The A s~~Station 72A waits until the preceding station terminates its transmission before adding its message to the message sequence 71.

Replace the paragraph beginning at page 16, line 22 with the following paragraph:

The stations 72A and B can also operate under any media access, network, transport, session, presentation, or application protocol. These protocols include, but are not limited to, the Ethernet standard, as specified by International Standards Organization (ISO) 802.3, Mil_Std 1553, ARINC_429, RS-232, RS-170, RS-422, NTSC, PAL, SECAM, AMPS, PCS, TCP/IP, frame relay, ATM, fiber channel, SONET, WAP, and InfiniBand.

Replace the paragraph beginning at page 24, line 10 with the following paragraph:

Some examples will now be given on the generation of such tables and the assignment of a bus master in order to illustrate how stations can be both added and dropped from the network physical layer. First, with reference to Figure 17, a network 140 includes stations 142A, 142B, 142C, 142D, and 142E ~~A, B, C, D, and E~~ connected to a bus 144. In this example, all of the stations A to E are assigned the same wavelength, λ_1. ~~The C s~~Station 142C has been initially assigned the SBM and first pings each station and measures the associated delay time in receiving a response. ~~The C s~~Station 142C then creates a table, such as the one shown below in Table 1. Based on the delay times, ~~the C~~ station 142C finds that ~~the D~~ station 142D is closest followed by ~~the E~~ station 142E, ~~B~~ station 142B, and ~~A~~ station 142A. ~~The C s~~Station 142C then assigns ~~the A~~ station 142A to be the new SBM since it is farthest away from ~~the C~~ station 142C. In this table, note that $0 < \Delta t_{CD} < \Delta t_{CE} < \Delta t_{CB} < \Delta t_{CA}$.

Replace the paragraph beginning at page 25, line 3 with the following paragraph:

Next, ~~the A~~ station 142A generates its own table of stations and associated delay times, such as the one shown below in Table 2. The order of transmission authority according to this table is ~~the A~~ station 142A acting as the SBM followed by ~~the B~~ station 142B, ~~the C~~ station 142C, ~~the D~~ station 142D, and then ~~the E~~ station 142E as the EBM. During normal operation according to this arrangement, ~~the A~~ station 142A will generate the BOS message followed by its data message, ~~the B, C, D, and E~~ stations 142B, 142C, 142D, and 142E will then follow with their messages, and then finally ~~the E~~ station 142E will

append the EOS message to signal the end of a message sequence. In this table, note that $0 < \Delta t_{AB} < \Delta t_{AC} < \Delta t_{AD} < \Delta t_{AE}$.

Replace the paragraph beginning at page 26, line 5 with the following paragraph:

Figure 18 provides an example of a method 150 by which a new station interjects and becomes added to a network physical layer. With reference to Figure 18, at 151 a new station first waits and listens for the EOS message and, once found, sends a new station message onto the bus at 152. At 153, the new station then listens for a "who is there" message from the SBM which, when detected, responds by replying with a "here I am" message at 154. Referring again to the network shown in Figure 17, when new stations 142F and 142G want to be added to the network 140 these stations 142F and 142G transmit their new station message over the bus 144 after the EOS message. Upon detecting new stations, the SBM, which in this example is ~~the A~~ station 142A, recreates the table with these new stations. Table 3 shown below illustrates the addition of stations 142F and 142G to the table with their respective delay times. In this table, note that $0<\Delta t_{AG}< \Delta t_{AB} < \Delta t_{AC} < \Delta t_{AD} <\Delta t_{AE} < \Delta t_{AF}$.

Replace the paragraph beginning at page 27, line 3 with the following paragraph:

After recreating the table, ~~the A~~ station 142A then assigns the SBM to the farthest station, which is ~~the F~~ station 142F. By transferring the starting bus station to ~~the F~~ station 142F, the network 140 ensures that the bus masters are located at ends of the bus 144. If ~~the~~

~~A~~ station 142A remained as the SBM, the order of transmission would be A, G, B, C, D, E, and F, which is not optimal since it introduces a large delay time between the time ~~the G~~ station 142G transmits to the time when ~~the B~~ station 142B can transmit. An example of a table generated by ~~the F~~ station 142F is shown below in Table 4. In Table 4, note that $0 < \Delta t_{FE} < \Delta t_{FD} < \Delta t_{FC} < \Delta t_{FB} < \Delta t_{FA} < \Delta t_{FG}$.